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Treatment Manual

Nonchemical Treatments

Heat • Vapor Heat Treatment

Contents

Principle

This treatment uses heated air which is saturated with water vapor to raise the temperature of the commodity to a required point and holds the temperature for a specified period. The latent heat released by the condensation of the vapor on the commodity raises the pulp temperature quickly and evenly and thus prevents damage. In application, a fine mist and air under forced circulation is present with the saturated vapor. VH treatment is used primarily for fruits and vegetables that are hosts of fruit flies.

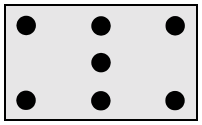
Schedules

The time-temperature relationship varies with the commodity and the pest involved. Typically, the pulp temperature of the commodity is raised by the saturated water vapor to 110 °F–112 °F (43.3 °C–44.4 °C) during a period of 6 or 8 hours and then held at the required temperature for an additional 6 or 8 hours. The fruits and vegetables are cooled immediately after treatment. An option with the shipper includes a pretreatment conditioning, usually at a relative humidity of less than 100 percent. The officer is expected to inform the shipper of current practices and recommendations on the subject. See T106 for approved VH schedules.

Procedures

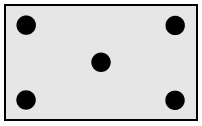
1. Temperature sensors are used to determine the pulp temperature of the commodity under treatment, psychrometers are used to determine the existing relative humidity. The tips of the sensors are inserted in the centers of individual fruits and vegetables, a typical sensor placement in the crates is shown below:

One layer only—7 sensors



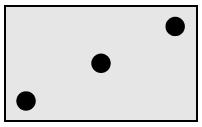
Multiple layers

Bottom layer—5 sensors



Middle layers—4 sensors

Top layers—3 sensors



Hot air duct—2 leads
(1 wet, 1 dry = psychrometer)

2. Professionally engineered vapor heat processors employing a duct system, which delivers the vapor directly to each individual stack of commodity and which channels the air flow directly through the stack, may utilize the following sensor placement:

Bottom, Middle, and Top Layers (A total of 9 sensors)

Hot air duct—2 sensors (1 wet, 1 dry = psychrometer)

When several commodities are being treated simultaneously, temperatures must be determined for each commodity.

The stacking of the loaded crates in the treatment chamber must insure uniform circulation of the vapor. The floor must be completely covered, unused portions of the floor being covered with empty crates, heavy paper, or cardboard. This paragraph is not applicable if 2. above applies.

Vapor heat processors must be approved prior to use for APHIS treatments. Plans and specifications showing dimensions, air circulation, and other specifications of the heating and temperature recording systems should be sent to the Director, Oxford Plant Protection Laboratory, USDA-APHI-PPQ, 901 Hillsboro Street, Oxford, NC 27565. After preliminary acceptance of the plans and specifications, an on-site survey will be conducted which will do the following:

3. Compare the installation to the approved plans,
4. Check the air and water vapor circulation system, and
5. Check the calibration of the temperature monitoring system.

Upon successful completion of the performance survey and PPQ Form 480 (Treatment Facility), a Certificate of Approval (PPQ Form 482) should be issued. Vapor heat chamber equipment should be tested for correct functioning before each treatment. The accuracy of each temperature sensing element should be checked once a month during regular use with water at temperatures near the normal treatment temperatures.

All sensors, after calibration corrections, must register the required temperature or above at the beginning of treatment. A 0.3 °C (0.5 °F) deviation is considered within the range of acceptable tolerance thereafter. This tolerance applies to the humidity check sensors as well as those for host temperature recordings. Extend the treatment time by an amount equal to any periods when specifications are not met. Chambers must be equipped with recording temperature and humidity indicators. Detailed records of each treatment must be kept. Final calibration values for each temperature sensor must be recorded for the port files.

Safeguards

Adequate safeguards must be maintained to prevent reinfestation or contamination of the treated commodities or their containers. Packing rooms must be fly-proof and only treated host material permitted therein.